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THE DOMESTICATION OF CERTAIN RUMINANTS
AND AQUATIC BIRDS.

BY A. E. BROWN AND J. D. CATON.

The following correspondence will interest both naturalists and sportsmen :

ZOOLOGICAL GARDEN,
PHILADELPHIA, FRIDAY, NOV. 7, 1879.

HON. J. D. CATON.

Dear Sir :—The large amount of information which I have gained from your valuable work on the Antelope and Deer of North America, together with your well known interest in all matters relating to the domestication of the Cervidæ, leave me little hesitation in taking up a small portion of your time on the subject. My experience with our mule deer (*C. macrotis*) has been very similar to yours, with the exception that the adults, two bucks and one doe, which were first procured by the Society four years ago, have all done well and are now in very excellent condition. In the summer of 1878, we bred two fawns, and during the past summer three more, two of these being twins, one of which died when two days old. The other four turned out just as yours have done; all were subject to diarrhœa, which was checked by the use of astringent food, as oak leaves and ragweed, to avoid as much as possible the giving of medicines, but in every case the disease returned. This summer I have regularly plied them with tonics, first iron water, from a spring near the garden, then sulphate of quinia, and finally gentian powders, with good effect for a while but without affecting the general result. In each case I have found on post mortem examination, a similar condition of things—the diarrhœa resulted from cancer of the stomach (except in the youngest,

some four months old, in which there was peritonitis, but no localized center of irritation); the general physical condition was poor, tubercles generally being found in the liver and spleen; in each case death was immediately owing to the presence of a fibrous clot in the heart, resulting from the generally impoverished condition of the animal. All had fed well or rather voraciously up to the day of death.

The females have never appeared to take much care of the young, and they have been weaned very early. I have about determined, if I have an opportunity to try again, to attempt to raise the young altogether by hand. This is, of course, always risky, but from past experience I am inclined to think it no more so than to leave them with the mother. It is very difficult to give them the proper amount of arboreal food, and its place has to be supplied mostly with ordinary dry food and grass, hay, a little corn, bran several times a week, either wet or dry as may seem to be desirable for the condition of the animal. I have not noticed in any of our specimens, the elongation of the hoof which you observed in yours. I will be exceedingly glad if you can give me any ideas or suggestions which would serve to promote my attempts to domesticate the species—as thus far I confess to a complete failure—the breeding of healthy offspring being the best possible measure of success in domestication.

It will not be uninteresting to you to know what my experience has been with other species of deer. We have had in the collection the following:

Moose (*Alce americanus*).

Caribou (*Rangifer caribou*).

Wapiti (*Cervus canadensis*).

Common deer (*C. virginianus*).

White-tailed deer (*C. leucurus*).

Mule deer (*C. macrotis*).

Mazame deer (*C. campestris*).

Wood Brocket (*C. nemorivagus*). } South America.

Pudu deer (*C. pudu*).

Fallow deer (*Cervus dama*). Europe.

Axis deer (*C. axis*).

Sambur deer (*C. aristotelis*). } India.

All of five specimens of moose and eight of caribou have died at periods varying from three months to two years and five months,

in the moose, and not beyond nine months in the caribou, from hypertrophy of the heart; owing, in my opinion, in great measure to the impossibility of providing the proper kind and quality of arboreal food, and somewhat also to the climate and the limited range given them in a zoölogical garden. *C. canadensis* and *C. virginianus* have done well. We have bred a number of each and have lost none from natural causes, except some four or five fawns from improper care when first born. Of *C. leucurus* we have had but one specimen. The South American deer seem to be constitutionally weak. We have bred and raised several of *C. campestris*, as also of *C. aristotelis* and *C. dama*. In *C. axis* the female has had two abortions, and is now, I think, too old to breed. My experience with our prong-horn (*A. americana*) has also been similar to yours—they all die speedily from diarrhœa or hypertrophy of the heart; change of food and tonics seem to have no effect upon them. We have had some ten or twelve individuals, none of which lived more than fifteen months.

The only possible apology for so long a letter is the great interest of the subject, which I trust you will accept as sufficient to warrant the liberty, and I shall be glad to consider myself as under obligation for any result of your experience in the domestication of the mule deer, which you are at liberty to assist me with. I am, with much respect, your obedient servant,

ARTHUR E. BROWN.

I have just been much disappointed in losing a fawn of the Javan musk deer or Chevrotain (*Tragulus javanicus*). The mother refused from the start to take any care of it, and I succeeded in keeping it alive for three days, by hand, but it was too delicate to stand handling and has just died. The little thing weighed less than three ounces, the adults being only about ten inches high.—*A. E. B.*

OTTAWA, ILLINOIS, November 10th, 1879.

ARTHUR E. BROWN, ESQ., Gen'l Supt. Zoö. Soc. Philadelphia :

Dear Sir :—I am just in receipt of your very kind and interesting letter of the 7th inst., and hasten to reply and thank you.

I have received no more mule deer since my book was published, and about that time I lost my last of that species and also of the Columbia deer (*C. columbianus*), I am satisfied that they cannot be successfully domesticated in my grounds. They either find something which does not agree with them or something is want-

ing which they require—most probably the former. And hence I think that closer confinement will promise better results.

I added seven more antelope (*Antilocapra americana*) to my grounds, but all died in the course of the summer. Indeed all my experiments with ruminants, *fera naturæ*, whose natural habitation is confined to the United States, west of the Missouri river, have proved failures.

About two years since I received a mountain sheep (*Ovis montanus*)—a female, from General Miles, stationed at Fort Keogh, and in the spring following another (a young male), but in spite of every possible care, both have died with much the same complaints as the mule and Columbia deer. In less than a month after arrival diarrhœa set in and though arrested repeatedly it would always return. The male survived scarcely six months, the female nearly two years, but she grew but little and scarcely ever seemed well.

My Virginia deer continue to reduce in numbers till now I have not more than fifteen, though these seem to be vigorous and perfectly healthy, yet not prolific. I have turned my attention to hybridizing them with the Ceylon deer and the Acapulco deer (*C. acapulcensis*), which with the hybrids seem to be perfectly healthy and prolific. I think it remarkable that these small species of deer, from such great distances and warm countries, should be so hardy and prolific here—most of the thorough-bred does have had two fawns this year, and several of the hybrids to this buck brought from Acapulco have two fawns and all perfectly healthy. I consider these small deer a great acquisition. On some of the hybrids the metatarsal gland is wanting and on some it is present, while some will have it on one hind leg and not on the other.

My elk (*C. canadensis*), continue to do well and are so prolific that I have had repeatedly to reduce their number, and would be glad now to dispose of at least thirty. I have on an average about one old buck a year killed in battle, and sometimes another by some casualty, but all are healthy. Mine grow very large, and of all the Cervidæ they seem best adapted to domestication.

You mention among your other species of deer *Cervus leucurus*. After much study, I came to the conclusion that the *C. leucurus* was but a variety of *C. virginianus* and so stated in my work.

My efforts to acclimatize ornithological specimens have been interesting. The Canada goose (*Bernicla canadensis*), are very

easily domesticated. When taken adult, a month or two is sufficient to make them as tame as those that have been in the grounds for years. They are healthy and prolific.

The white fronted geese (*Anser caerulescens*) do not domesticate so readily, and have not reproduced, though they were observed to couple last spring.

The Hawaiian geese (*Bernicla sandvicensis*), which I brought over in the spring of 1878, have proved hardy and I trust will prove reproductive. They were well sheltered and cared for last winter, and came through in good order. Both geese commenced laying in April, one laid three and the other four eggs, but only one showed a disposition to set upon the eggs, and she, after attending to her business faithfully for ten days, tired of it and quit the nest, so they produced no goslings.

In the wild state they lay but two or three eggs, while in domestication they sometimes lay eight or ten.

Mr. Brickwood, Post Master General of the kingdom, who had them in domestication for many years, sometimes raised as many as ten in a brood.

In domestication they seem to have strong attachments and are fond of human society, one gander in particular has become very fond of me, and always greets me cordially, and will *talk* with me in a low, soft plaintive tone so long as I will indulge the humor.

They are less aquatic than the other geese. The foot is not more than half webbed. They take a bath scarcely once a day, and rarely remain in the water long. I once saw one with the tail under water as we see a hen when forced to swim. Their native habitat is the high volcanic mountains in the Island of Hawaii, where they breed among the lava beds, depending upon the pools which they find among the rocks for water, never going down to the sea. They are of strong flight in the wild state, though in domestication they show little disposition to fly. Altogether they are the most interesting water-fowl which I possess, and I hope another year to raise some of them from the only pair I have left. A few weeks ago I lost the other pair by a mink.

I can add little to your observations on Japanese and Chinese geese. The former is twice as large as the latter. These have black legs, while those have yellow. They are very noisy, fairly discounting the Guinea fowls.

I supposed I had a pair of sand-hill cranes (*Grus canadensis*),

till they were seven years old, when both laid eggs and have done so now for three years. They lay two eggs each upon the naked ground without the least appearance of a nest, and far away from the water. Last spring I procured a young male (as I suppose), but no two of the three ever associate together, as far as observed. One of the females sat about ten days upon her eggs last spring and then gave it up. The crows dined on the eggs of the others.

I hope in the future to write more fully my observations on the mountain sheep and the Hawaiian geese, both of which are interesting subjects of study and are not very thoroughly understood. Very truly yours,

J. D. CATON.

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THE CRITICS OF EVOLUTION.

BY J. S. LIPPINCOTT.

[*Continued.*]

Opposition of Dawson.—Prof. Dawson is also an inconsistent writer. In 1869 he published his “Modern Ideas of Derivation,” an address to the students of McGill College, Montreal, in which he stated his belief, that Prof. Cope’s hypothesis, as advanced in his “Origin of Genera,” is the “most promising of all that have been announced,” and as “holding forth the most promising line of investigation by which we may hope ultimately to arrive at more true expression of the law of creation with reference to organized beings.” This was an admission that he was in accord with the evolutionists.

Prof. Dawson is among those who have attempted to harmonize Scripture and science. I am unable to see that they can at present be harmonized, and am confirmed in the belief in the difficulty, by the opinion of the ablest geologists with whom I have the good fortune to be acquainted. Moreover, Prof. LeConte, of the University of California, confirms this impression. He also has written and lectured largely upon this subject, for the benefit of the Young Men’s Christian Association, and is a firm believer in the truths of revealed religion. LeConte candidly admits that all attempts to reconcile the Mosaic cosmogony with the results of science must be distasteful to the philosophical Christian. They must ever be but artificial and ingenious human devices. Far better to regard the books of Revelation and of